SWMU SUMMARY REPORT

Bayer MaterialScience, LLC

New Martinsville, WV

USEPA No. WVD056866312

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Tables

Acronyms

Working on

EPA	Environmental Protection Agency
CMS	Corrective Measure Study
COI	Constituents of Interest
DOCC	Description of Current Conditions
DWM	Division of Waste Management
ISB	In-situ Bioremediation
ISCO	In-situ Chemical Oxidation
NPDES	National Pollutant Discharge Elimination System
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SSR	SWMU Summary Report
SWMU	Solid Waste Management Units
TDI	Toluene Diisocyanate
WVDEP	West Virginia Department of Environmental Protection

1.0 Introduction

Bayer MaterialScience LLC (Bayer) has prepared this SWMU Summary Report (SSR) for the Bayer, New Martinsville, West Virginia facility (the Facility). The purpose of this SSR is to explain the proposed remedy to address various Solid Waste Management Units (SWMUs) at the Facility and to provide a summary of investigation and corrective measures studies used in the remedy selection process.

The proposed remedy for the Facility is capping of SWMU Group A, institutional controls, in-situ treatment to reduce constituent mass at selected SWMUs, and extraction and treatment of groundwater to maintain hydraulic containment of impacted groundwater on the Facility.

2.0 Facility Background

The Facility was constructed in 1954 by Mobay Corporation to produce polyester resin. In 1956 the Facility became the first in the United States to produce toluene diisocyanate (TDI). Most of the products that have been produced at the facility were used in the polyurethane industry. Two notable exceptions were polycarbonate (1957-1982) and Iron oxide (1980-2006)

Mobay Corporation changed its name to Miles Inc. in 1992 and subsequently changed its name to Bayer Corporation in 1995. Today the facility is part of Bayer MaterialScience, which is a subgroup of Bayer Corporation.

In recent years the Facility has seen significant changes and many of the operations have been shut down and dismantled. The major events are listed in Table 1.

TABLE 1

OVERVIEW OF HISTORICAL PRODUCTION OPERATIONS

DATE	EVENT(S)
1954-1955	Plant commenced operation to produce polyester resin; Polyester-I facility opens
1956	Monoisocyanate, toluenediamine (TDA)/toluene diisocyanate (TDI) production begins; first in U.S. to produce TDI
1957	Multipurpose isocyanate produced; polycarbonate production begins
1961	Dinitrotoluene (DNT) production begins
1962	Batch production of methylene dianiline (MDA), Mondur (MR) isocyanate and methylene diphenyl diisocyanate (MDI) begins; central hydrochloric acid (HCl) absorption unit installed; polycarbonate production shutdown
1963	Reformer #1 isocyanate processing begins; New TDA/TDI production facility constructed
1964	Original TDA/TDI facility closed; polycarbonate production recommissioned
1965	Mononitrobenzene (MNB) production begins; aniline and MR-isocyanate production begins
1967	MDA-II production begins; nitric acid production begins; reformer #2 isocyanate processing begins
1969	Polyol production begins; CB Coatings production begins
1970	Polyester-II resin production begins; Texin urethane resin production begins; MDA/MR/MDI-II production begins
1971	Wastewater treatment facility opens
1978	PHD Polyol production begins
1980	Iron oxide pigment production facility complete and production initiated
1982	TDI isomer separation process begins; polycarbonate production shutdown
1983	Aniline production shutdown
1986	The original polyester production shutdown; dispersion unit opens
1987	Monoisocyanate production shutdown
1988	Fluid Bed Incinerator (FBI) for waste incineration put into operation
1993	Off-Gas Thermal Oxidizer at the hydrochloric acid plant begins
1994	MNB production discontinued
1995	Dispersion Unit shutdown
1999	TDA, Sulfuric Acid, DNT, Nitric Acid Units shutdown
2000	PU Dispersions and portions of Iron Oxide shutdown
2002	Another portion of Iron Oxide shutdown
2005	CB Coatings unit and TDI unit shutdown
2006	Remainder of Iron Oxide unit shutdown
2007	MDA/MDI units shutdown
2009	Dispersions and Polyester units shutdown

2.1 Facility Location and Setting

The New Martinsville Facility is situated within the Ohio River Valley at the base of the West Virginia Northern Panhandle in Marshall and Wetzel Counties approximately five miles north of the city of New Martinsville, West Virginia. The facility is bounded by an industrial facility to the north, the Ohio River to the west, West Virginia Route 2 and steeply sloped terrain to the east, and the small town of Proctor, West Virginia to the south.

The main aquifer beneath the Bayer facility is the Ohio River Valley Alluvial Aquifer. The alluvial aquifer beneath the Bayer facility consists generally of an elongated lens of up to 20 feet of fine sand with varying amounts of silt overlying a medium to coarse sand and fine gravel outwash deposit that averages 20 to 30 feet in thickness.

The alluvial aquifer beneath the Facility has been pumped by three (3) groundwater recovery wells since 1986. In addition, an adjacent industrial facility extracts groundwater periodically from a production well at the northwest corner of the Facility. Under pumping conditions, groundwater flow within the alluvial aquifer is radial toward the center of the Facility under the main plant area, with induced river flow becoming the main source of aquifer recharge (Geraghty & Miller, 1985a). In 2013, the Facility will bring two additional groundwater extraction wells on line in the vicinity of SWMU Group A to minimize potential impacts from this unit.

Beneath the alluvial aquifer, there is a bedrock system capable of producing groundwater. This upper bedrock strata yield low volumes of groundwater characterized by water quality that is significantly different than the overlying alluvial aquifer . These two strata are separated by shale confining layers and also by the upward hydraulic gradient exerted by the bedrock system.

2.2 Environmental History

The RCRA Corrective Action process was first implemented at the Facility in the 1980's with the RCRA Facility Assessment being completed in 1988. The Facility has been

pumping and treating groundwater since 1986 and completing Annual Groundwater Reports since 1985. These have shown the groundwater impacts to be stable and hydraulically contained on site since the pumping began. Major RCRA Corrective Action reports for the Facility are listed in Table 2, along with the submittal and approval dates (if applicable).

Several investigations of the Facility have been conducted over the past 30 years. A Description of Current Conditions (DOCC) Report prepared in 1995 pursuant to the RCRA Corrective Action process summarized key findings of those previous investigations to serve as a baseline for subsequent data gathering and analysis during the RCRA Facility Investigation (RFI) to follow.

The DOCC summarized all available information regarding all of the Solid Waste Management Units (SWMUs) previously identified and justified their inclusion in the RFI. The DOCC identified thirty (30) SWMUs to be included in the RFI.

The RFI was conducted in three phases between 1995 and 2001. The report on the third and final phase of the RFI was submitted December 2001 and approved by EPA on October 13, 2004. The RFI focused on evaluating the thirty (30) SWMUs and collecting data to support the next phase in the RCRA Corrective Action process, a Corrective Measures Study (CMS), which was subsequently completed for the Facility in 2007.

The RFI determined that there were no unacceptable risks associated with the direct exposure pathway for any of the thirty (30) SWMUs and that no-further action was needed to address that potential exposure pathway. The RFI further concluded that sixteen (16) of the thirty (30) SWMUs were to be evaluated in the CMS for site-wide groundwater, pursuant to each SWMUs potential to leach constituents of interest (COIs) to groundwater at potentially unacceptable concentrations.

Table 2
Environmental Reports

Report Title	Content	Author / Date Submitted	Agency Approval
RCRA Facility Assessment Report	Identified documented releases and/or potential releases that required further investigation under RCRA Corrective Action protocols.	IT Corporation, 1988	—
Description of Current Conditions	Facility background, history, SWMUs and history of releases	ICF Kaiser, 1995	—
Industrial Use Designation Letter	Confirmed that the Facility use is considered to be industrial and will be for the foreseeable future.	USEPA, August 2000	Not Applicable
RCRA Facility Investigation Report	The RFI discussed the nature and extent of releases of hazardous wastes or hazardous constituents from regulated units, solid waste management units, and other source areas at the facility, and to gather all necessary data to support the environmental indicator determinations and a Corrective Measures Study. The RFI Report also included a human health risk assessment and/or ecological evaluation.	IT Corporation, December 2001	Oct 13, 2004
RCRA Corrective Measures Study Report	The purpose of the CMS was to develop and evaluate the corrective action alternative(s) and to recommend the corrective measure(s) be taken at the facility.	URS/Potesta, May 2007	Sept 29, 2010
Corrective Measure Implementation Plan for SWMU Group A	Provided details for chosen corrective measure.	Tetra Tech, 2011	Aug 3, 2011
Facility Groundwater Recovery System Optimization Modeling	Provided an evaluation of pumping rates to maintain hydraulic capture of groundwater beneath the Facility.	Civil and Environmental Consultants, November 2011	Not Applicable
Construction Completion Report – SWMU Group A Corrective Measures	Documented the implementation of corrective measures for SWMU Group A (capping and recovery well installation)	Preparation In Progress	--
PORE water and Sediment Sampling	Summary of Sampling and Analyses	Dec 2012	Under Agency Review

Lead responsibility for Agency oversight of the RCRA Corrective Action process at the Facility began to transition following completion of the RFI. In 2004, the WVDEP received EPA authorization to carry out the RCRA Corrective Action Program statewide. The Bayer Facility is one of thirty-three (33) RCRA Corrective Action facilities within West Virginia. The WVDEP decided that initially, the WVDEP Division of Waste Management (DWM) would transitionally assume responsibility for Corrective Action oversight at ten (10) of the thirty-three (33) facilities in the state. The Bayer Facility was among those 10 selected for the initial transfer.

The CMS entailed identification and evaluation of Corrective Measures alternatives for the Facility and recommended a best-balanced Corrective Measures alternative. Prior to completing the CMS, the Corrective Action Objectives (CAOs) to be attained were defined and approved by the Agencies.

The CMS identified twenty-one (21) potential Corrective Action technologies to address site-specific environmental concerns. The technologies involve a full range of potential corrective actions for the SWMUs including: removal, in-situ and ex-situ treatment, containment and institutional controls. Potential technologies for groundwater included natural attenuation, physical and hydraulic containment barriers, passive treatment walls, collection trenches and institutional controls. The initial list of twenty one (21) potential technologies was narrowed to a list of twelve (12) technologies for a more thorough evaluation. The list of technologies was reviewed with the Agencies and approved.

Six Facility Corrective Measures Alternatives were then developed from various combinations of the potential Corrective Action technologies. All of the alternatives were assessed to be capable of meeting the approved Facility CAOs and the proposed media-specific cleanup goals. Estimated present values of the alternatives range from $12 Million to $22 Million. A best-balanced alternative was selected and recommended from among the six alternatives, based on a comparative analysis of their abilities to provide protection of human health and the environment; their short-term and long-term effectiveness; their ability to reduce toxicity, mobility, or volume of contaminants;

implementability; costs; and community and State acceptance. The recommended Facility Corrective Measures Alternative was further evaluated with respect to its consistency with statutory requirements related to protection of public health and the environment, cost effectiveness and preference for treatment as a primary element; and the consistency of the alternative with RCRA guidance and with recent Region 3 precedent.

Key features of the recommended Facility Corrective Measures are as follows:

1. Facility use will remain industrial.
2. Institutional Controls will be an important protective element of the Corrective Measures.
3. Development and implementation of site-specific, cost effective on-site treatments to address sources of contaminants in Facility Soils that may leach to Facility Groundwater will be key to improvement of the contaminant levels in Facility Groundwater.
4. Long-term containment of Facility Groundwater will be required during the lengthy period of time needed to improve Facility Groundwater quality.
5. Protection of human health and the environment will be maintained and assured for the long-term throughout implementation of the Corrective Measures and confirmed on an on-going basis by performance monitoring at the POC.
6. The goal for the recommended Corrective Measure is the attainment of Facility CAOs and media-specific cleanup objectives.

Implementation of Corrective Measures to address the sources of contaminants to Facility groundwater and to contain and improve Facility groundwater will continue as well as monitoring to confirm performance and continuing protection.

Sediment and pore water sampling of the Ohio River was performed and the results were provided to UESPA in December 2012. USEPA is currently reviewing the results. However, a preliminary internal review did not indicate significant, facility related impacts via a groundwater to surface water pathway.

2.3 SWMU Descriptions

The Final RFI report for the Facility identified 30 SWMUs, which are presented in Table 3. Each of the SWMUs was investigated as part of the RCRA Facility Investigation. SWMU Groups A through D are combined from various SWMUs based on location. In addition to the SMWUs, groundwater was evaluated on a site-wide basis and is part of a long term monitoring program. Soil and groundwater constituents of concern are provided in Table 4 on a media specific basis.

2.4 Site-wide Groundwater

Groundwater sampling has been conducted at the Facility since 1985 and has indicated environmental impacts to the alluvial aquifer from volatile and semi volatile organic compounds (VOCs and SVOCs). The RFI included a screening groundwater risk evaluation utilizing groundwater data available from on-site and off-site wells. Groundwater analytical results were compared to USEPA MCLs for drinking water or to USEPA Region III RBCs for tap water. Twenty-one (21) constituents in on-site wells exceeded at least one of these screening criteria. No constituents from offsite wells were in excess of the screening criteria. COIs found in the on-site groundwater consisted primarily of VOCs and SVOCs (See Table 4). The RFI concluded that the affected groundwater is contained on-site. More recent groundwater data from the 2012 Groundwater Monitoring Report (Tetra Tech, Inc., 2013) confirmed that the alluvial aquifer contaminant plume is stable and is being contained on-site by existing recovery well operations. Since the recovery wells were installed in 1986 all groundwater elevation readings have demonstrated on-site plume hydraulic containment

Table 3
SWMU Identification With Status

SWMU Group	SWMU Number	Name	Status	Institutional Controls Required
A	1	South Landfill	Capped Based On Corrective Measure Study	Yes
	2	Sludge Lagoon		
	3	Fill Area, Hydroblasting Station		
	4	Ash Lagoon		
B	5	Residue Fill Area, Unit 3Fc	NFA for Direct Contact; Recommended for investigation for leaching potential to groundwater	Yes
	6	Residue Fill Area, Unit 3Fd		
C	7	Fill Materials, Block 21	NFA for Direct Contact; Recommended for investigation for leaching potential to GW	Yes
	8	All Purpose Burning Pit		
	9	Residue Fill Area, Unit 3 Fe		
	11	Acid Neutralization Spill Basin 5Fg		
D	10	Infilled Wastewater Ditch	NFA for Direct Contact; Recommended for investigation for leaching potential to groundwater	Yes
	12	Former Neutralization Spill Basin		
	15	Neutralization and Settling Basin, 5Fa		
	16	Neutralization Basin 5Fe		
N/A	13	Existing Process Trench	NFA	Yes
N/A	14	Fill Materials, Block 11	NFA	
N/A	17	Polyol Spill Area	NFA	
N/A	18	Lab Area 24A	NFA	Yes
N/A	19	Residue Fill Area, Unit 3Fa	NFA	Yes
N/A	20	Nitrations Neutralization Settling Basin 5Fb	NFA	
N/A	21	Nitrations Neutralization Settling Basin 5Fc	NFA for Direct Contact; Recommended for investigation for leaching potential to GW	Yes
N/A	22	Vortex Burner	NFA	Yes
N/A	23	TDI Area 26B	NFA	
N/A	24	Neutralization Trench/Basin 5Fd	NFA	
N/A	25	HCL Area 15C	NFA	Yes
N/A	26	Former Waste Disposal Incinerator	NFA	
N/A	27	Mononitrobenzene Area	NFA for Direct Contact; Recommended for investigation for leaching potential to GW	Yes
N/A	28	Iron Oxide Area 28A	NFA	
N/A	29	Fill Materials Block 28	NFA	
N/A	30	Residue Fill Area, Unit 3Fb	NFA	Yes

NFA=No Further Action

Table 4
Constituents of Interest by Media

Constituent	Soil	Groundwater
Volatile Organic Compounds		
1,1,1-Trichlorethane		X
1,2-Dichlorobenzene		X
1,4-Dichlorobenzene	X	X
Carbon tetrachloride	X	
Chlorobenzene	X	X
Benzene	X	X
Methylene Chloride	X	
Toluene	X	X
Trichloroethene	X	X
Trichlorofluoromethane	X	X
Semi-Volatile Organic Compounds		
1,2-Dichlorobenzene	X	X
1,2,4-Trichlorobenzene	X	
2,4-Dinitrotoluene	X	X
2,6-Dinitrotoluene	X	X
2,4-Toluenediamine	X	X
4,4-Methylenedianiline		X
5-Nitro-o-toluidine		X
Aniline	X	X
Bisphenol		X
Bis(2-chloroethyl)ether	X	
Bis(2-ethylhexyl)phthalate		X
p-Chloroaniline	X	X
Chlorobenzene	X	
m-,p-Cresol	X	
p-Nitroso-di-n-propylamine	X	
n-Nitrosodiphenylamine	X	
Nitrobenzene	X	X
m-, o-, and p- Nitrotoluene		X
m-,o- and ,p-Toluidine	X	X
Metals		
Antimony	X	
Cadmium	X	
Chromium	X	
Lead	X	
Nickel	X	

3.0 Interim Measures

Bayer has initiated health and safety work practices for on-site workers who could potentially come into contact with SWMUs or Facility groundwater. Industrial controls will be maintained where appropriate to prevent unsafe exposures.

Additionally, Beaver Run which formerly flowed just beyond the southern limits of SWMU Group A was relocated to the south to prevent the stream from eroding into the SWMUs and to eliminate any potential impacts from the SWMUs on the surface water in Beaver Run.

4.0 Summary of Facility Risks

The risk assessment performed as part of the RFI concluded that there were no unacceptable risks associated with the direct exposure pathway for any of the 30 SWMUs and that no further action was needed to address that exposure pathway. The RFI further concluded that 16 of the 30 SWMUs were to be evaluated in a Corrective Measure Study (CMS) for site-wide groundwater, based on potential for constituents from each of these SWMUs to leach to groundwater at potentially unacceptable concentrations.

The RFI included a screening groundwater risk evaluation utilizing groundwater data available from on-site and off-site wells. Groundwater analytical results were compared to USEPA MCLs for drinking water or to USEPA Region III RBCs for tap water. Twenty-one (21) constituents in on-site wells exceeded at least one of these screening criteria. No constituents from offsite wells were in excess of the screening criteria. COIs found in the groundwater consisted primarily of VOCs and SVOCs. The RFI concluded that the affected groundwater is contained on-site via the groundwater extraction system. The extracted water is treated to acceptable standards prior to controlled discharge in accordance with the Facility's National Pollutant Discharge Elimination System (NPDES) permit.

The Facility is fenced and is monitored by the Facility's security guards. Exposure to both soil and groundwater is controlled by plant procedures that are designed to be protective of worker safety. There are several volatile organic compounds in soil and groundwater that could potentially migrate to indoor air; however, occupied buildings located in these areas do not have below-grade structures.

5.0 Environmental Indicators

EPA sets national goals to measure progress toward meeting the nation's major environmental goals. For Corrective Action, EPA evaluates two key environmental indicators for each Facility: (1) current human exposures under control and (2) migration of contaminated groundwater under control. EPA determined that the Facility met these indicators on February 5, 1999 in the "Interim Final – Documentation of Environmental Indicator Determination".

6.0 Scope of Corrective Actions

A CMS was completed for the Facility in 2007 by URS Corporation and Potesta and Associates, Inc. The CMS included the identification and evaluation of corrective measure alternatives for the Facility and recommended a best-balanced alternative. The areas included in the CMS based on the results of the RFI are as follows:

1. SWMU Groups A, B, C and D; SWMU 21; and SWMU 27 – based on the potential for COIs to leach from the SWMU affected soils to Facility Groundwater at concentrations of potential concern, and;

2. Facility Groundwater.

Corrective action (or measure) objectives (CAOs) are general descriptions of what corrective measures at the Facility are intended to accomplish. The CAOs are media specific and time dependent (short-term and intermediate/long-term timeframes). The CAOs are premised on the Facility remaining industrial. The corrective action objectives, as defined in the CMS, are as follows:

Overall CAO:

- At all times, prevent unacceptable human exposure (carcinogenic risk > 1 x 10-6 and Hazard Index > 1) from COI affected Groundwater and Soils

Facility Soil CAOs:

- Prevent unacceptable industrial worker exposures to shallow (0 to 2 ft-bgs) surficial soil COIs (i.e. detected contaminants),
- Prevent unacceptable construction worker exposures to subsurface (0 to 5 ft-bgs) soil COIs, and
- Prevent unacceptable construction worker exposures to soil COIs (at all depths).

Facility-wide Groundwater CAOs:

- Prevent unacceptable human exposures to recovered contaminated groundwater;
- Maintain current groundwater recovery well system operation for groundwater collection and plume hydraulic containment within the Facility boundary;
- Provide for the continued control of potential off-site migration of contaminated groundwater to a level that is protective of surface water quality, and;
- Implement reasonable efforts to eliminate or mitigate further releases of contaminants from SWMUs (using the site boundary as the point of compliance).

6.1 Proposed Corrective Actions and Current Status of Implementation

As stated in the CMS the proposed corrective action for the Facility consisted of the following items that meet the stated CAOs:

SWMU Group A: With USEPA approval, Bayer has proceeded to implement the proposed remedy with completion of the SWMU Group A soil cap and ground water collection system completed in 2012. Two groundwater recovery wells were installed in the SWMU Group A area to enhance the Facility-wide groundwater containment system. These wells should be operational by April 2013 and the final report will be submitted to EPA during the second quarter of 2013.

SWMU Groups B, C, and D, and SWMUs 21 & 27: The technology demonstration program is being implemented at selected SWMU areas. Implementation of the technology demonstration program will provide site-specific data on the feasibility of various in-situ technologies pursuant to the COIs in the selected areas and treatability design data information (including, but not limited to estimating oxidant and/or bio-supplement suitability, optimum dosage rates, application methods, and monitoring protocols).

The technology demonstrations are designed to be bench scale followed by pilot-scale, in-situ tests for a selected technology within the selected SWMUs. If the technology demonstrations are shown to be successful, the full-scale application will be implemented on a selective basis leading to significant reductions in SWMU constituent levels and mass loading to the Alluvial Aquifer. These reductions should result in an acceleration of long-term improvements in alluvial aquifer water quality. The effect of these reductions on water quality improvement will be assessed at significant milestones during the technology demonstrations.

Currently work has focused on SWMU 21 with parallel paths of In-Situ Biological (ISB) and In-situ Thermal Destruction (ISTD) Bench Testing being pursued. The facility will continue to conduct studies for mass removal of pollutants.

Facility-Wide Groundwater: Facility-wide groundwater has been hydraulically controlled via groundwater extraction wells with treatment in the Facility's NPDES permitted wastewater treatment plant. Two new extraction wells were installed in 2012 as part of the SWMU Group A capping project. These wells supplement the existing hydraulic controls and further limit potential impacts from SWMU Group A. Groundwater modeling has been performed to further evaluate and optimize the hydraulic control system. This modeling shows that a cumulative pumping rate of approximately 130 to 180 gpm from the five Bayer wells is sufficient to maintain hydraulic containment. A pumping rate of approximately 325 gpm will be needed to maintain hydraulic containment under a worst-case scenario, which occurs when the river levels are abnormally low. This pumping will be optimized as necessary to maintain plume capture.

6.2 Evaluation of Effectiveness of Corrective Actions

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Overall protection of human health and the environment addresses the ability of an alternative to eliminate, reduce or control threats to public health or the environment through institutional controls, engineering controls, removal or treatment.

Groundwater pumping and treating technology employed has been a primary tool in effectively and reliably protecting public health and the environment over the past twenty five (25) years of operation. Minimum pumping rates of 130 to 180 gpm (total of all the wells) have proven effective in containing the groundwater plume on-site and protecting nearby Grandview Doolin PSD.

LONG TERM EFFECTIVENESS

Long-term effectiveness considers residual risk and the ability of an alternative to maintain protection of human health and the environment over time. This criterion includes consideration of residual risk following the implementation of Corrective Measures and the adequacy and reliability of controls.

The selected corrective measures provide the long-term effectiveness based on reduction of residual risk by groundwater extraction and treatment, coupled with capping SWMU Group A which reduces infiltration of precipitation and the potential for leaching additional constituent mass. The in-situ treatment of soils in the SWMU Groups B, C & D and individual SWMUs 21 & 27 will further reduce the mass and mobility of COI in these areas.

REDUCTION OF TOXICITY, MOBILITY OR VOLUME

Reduction of toxicity, mobility or volume of waste considers the alternative's ability to reduce the harmful effects of COIs in the waste, the ability of the COIs to move in the environment and the amount of COIs present, including how the alternatives compare relative to EPA's expectation to use treatment as follows:

"EPA expects to use treatment to address the principal threats posed by a site whenever practicable and cost effective. Contamination that represents principal threats for which treatment is most likely to be appropriate includes contamination that is highly toxic, highly mobile, or cannot be reliably contained, and that would present a significant to human health and the environment should exposure occur." (61 FR 19448)

This Facility does not pose any "principal threats". That situation notwithstanding, as reflected in the RFI, all threats to human health and the environmental represented by the Facility have been "reliably contained" (61 FR 19448), thus managing and reducing the mobility of Facility COIs, for over 20 years - primarily as a result of the pumping and treatment of Facility groundwater. In the 20 years of operation of the groundwater pump and treat system, an estimated 4.2 billion gallons of water have been extracted for treatment and 725,000 pounds of organic material have been removed from the alluvial aquifer. Therefore, pursuant to the CAO for groundwater requiring, "...reduction of contaminant levels, as practicable, over time to support reasonably expected use", there is evidence that the mobility and volume of COIs at the Facility is being quantifiably reduced.

The fact that there has been an extended period of time at the Facility during which contaminant volumes are being reduced without quantifiable reductions in Facility COI concentrations in the leaching medium, parallels experiences at many other RCRA and CERCLA pump and treat sites. The concentration in the leaching medium is a function of several other variables characterizing the COIs in addition to the ``volume of the source". These variables include solubility and adsorption coefficients, partition gradients, equilibrium concentrations, contact time, etc. The current concentration levels of COIs in Facility groundwater do not imply a failure of the pump & treat technology in place at the Facility in reducing of toxicity, mobility or volume. Concentration levels of COIs in Facility groundwater will decrease with continued containment and removal of COIs from the groundwater via implementation of the enhanced facility-wide groundwater containment and treatment system and reduction of sources via in-situ treatment.

These engineering controls and treatment approaches coupled with utilization of institutional controls will be effective on a long-term basis. The use of pump and treat technology over the past twenty-five (25) years has proven the ability of this approach to reduce the mobility and volume of wastes and effectiveness in protecting human health and the environment over the long term.

SHORT-TERM EFFECTIVENESS

Short-term effectiveness considers the length of time needed to implement a corrective measure and the risks to workers, residents and the environment during the implementation and operation until Facility CAOs and media specific goals are achieved. Types of risks and factors to be considered include: fire, explosion, exposure to hazardous substances and potential threats associated with treatment, excavation, transportation and re-disposal or containment of waste material.

IMPLEMENTABILITY

Implementability addresses the technical and administrative feasibility of implementing the Corrective Measures from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other government entities are evaluated. There are no anticipated insurmountable problems with availability of services and materials for any of the proposed corrective measures. From a technical design and implementation standpoint, the soil cap and hydraulic containment were readily implemented. The in-situ technology demonstrations may be more difficult to implement depending on the subsurface materials and nature of the constituent in the various areas of the Facility. Although the in-situ approaches are less certain, these approaches are being implemented for COI mass reduction to meet the long-term site objectives and are not being implemented based on the level of risk.

7.0 References

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